



Adults' views on mathematics education: a Midwest sample

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Abstract

Currently, few studies have addressed public opinions regarding math education. The current study surveyed adults in a Midwestern town in the United States to assess opinions regarding math and math education. Overall, we found that adults believe that math is useful and that math education is important. We found that parents who currently have a child in elementary school believed that math should be taught at an earlier age and were more supportive of parents being responsible for math education outside of the classroom than other participants. In this paper, we discuss some of the implications of these findings for math education.

Keywords: mathematics education, survey, and public opinion.

Introduction

Mathematics is an important part of the curriculum for elementary students; however there is surprisingly little research on the attitudes and views of people towards mathematics education. Many studies exist on teaching strategies and best practices when it comes to mathematics in the classroom (e.g., Alterman, 1992; Behrend & Mohs, 2006; Heirdsfield, 2011); yet, few researchers have sought the opinions of the public regarding math education.

While one could argue that public opinion about mathematics is irrelevant to improving math education, we suggest that it is an important consideration and can be used to inform current practices. Empirical studies suggest that parental involvement is important to math education as children whose parents are more involved show better performance in math skills (Powell, Seung-Hee Son, File, & Froiland, 2012). If we can better understand parents' beliefs about math and math education, we can develop ways to better engage parents in the educational system. In addition to better understanding parents' views, it is also important to understand general opinion on these topics to help shape public policy. We know from other domains, such as political science, that public opinion has relevant applications to policy decisions (Page, 1994). One potential avenue for improving our educational system, and math education in particular, is to engage the public to gain support and motivation for policy changes.

In one of the few studies that assessed public opinion regarding mathematics, Lucas and Fugitt (2010) surveyed a sample of adults in the Midwest to assess people's attitudes towards the math education system and math educators. Unlike the current study, they went door-to-door to collect data from individuals in this small, Midwestern town (population 5,000; Lucas & Fugitt, 2010). Generally, they found that most adults believed that math education was important and the majority of adults reported using mathematics on a daily basis. Additionally, most adults felt that our math education system was adequate. Unfortunately, details regarding the sample, questions asked, or data analysis are lacking making strong conclusions from these data difficult.

In another similar survey, Kadlec and Friedman (2007) found that parents are worrying less about math education. They specifically surveyed parents of children in grades 6-12. Parents in this sample reported that schools are generally doing a good job of teaching math and that standards for this subject have risen (Kadlec & Friedman, 2007). While this study provides interesting data on the views of middle and high school education, it does not provide any conclusions regarding elementary school education.

The field is lacking data assessing parental views on math and math education, especially within the elementary school range. We know parental involvement in education is important for children (Lee Blair, 2014), especially within the domain of mathematics (Powell, Seung-Hee Son, File, & Froiland, 2012). Powell et al. (2012) found that higher parental involvement in the home with regards to cognitive stimulation related to increased performance on mathematics outcomes in school. They measured the level of cognitive stimulation in the home environment, including activities such as completing puzzles, teaching letters and numbers, and playing counting games. They found that measures of children's math skills at the end of first grade positively correlated with changes in cognitive stimulation at home. Beyond just having parents engaged in the learning process, parents have a very unique view of the education system as they are actively (some more so than others) embedded within it. It would be fascinating to survey both parents of elementary school children and those without children of that age to identify any similarities and differences between them regarding their attitudes about mathematics education.

The current study sought to address several of these concerns from the literature. Primarily, we were interested in adding to the literature on adults' views towards math education. Additionally, we wanted to compare views from parents and non-parents. We hypothesized that parents would have some different ideas about the education system due to their familiarity with the current educational climate.

Method

Participants

Participants included 569 adults (18 years or older) who were residents of the county surrounding the university. Participants were contacted via telephone to participate in a brief survey. An additional 46 people were contacted, but did not participate because they were on their cell phone while driving, in which case the researchers terminated the survey. We tested 233 males, 321 females and an additional 15 people who either responded as other ($n = 1$) or did not provide a response for their gender ($n = 14$). The average age of our participants was 51.16 years ($SD = 17.37$). Of those who provided their racial background ($n = 544$), the breakdown of our sample was 92.3% White, 2.9% African American, 0.7% Asian, 0.9% Hispanic/Latino, 0.2% Native American, 1.7% Other, and 1.3% Multiracial. Our sample is fairly representative of the county as a whole as the county is 86.1% white (U.S. Census Bureau, 2013). Of those who reported their education status, 99.9% of our sample had a high school degree or higher.

Materials and Procedure

Participants were asked a variety of questions regarding their attitudes and beliefs about math and math education (see Appendix A for the full survey). We included three additional questions that were only answered by parents of elementary students. Students from a research methods in psychology course administered the phone survey as part of a course requirement. Students were provided a script to read which contained all of the survey questions. The script and questions were embedded within an online survey so that answers were recorded as the participants responded.

Results

Descriptive statistics

Table 1 contains the descriptive statistics for several of the survey items. Overall, participants thought math was useful to them ($M = 4.72$ on a scale from 1-5; $SD = .70$), but generally had a neutral response when asked if they like math ($M = 3.84$, again on a scale from 1-5; $SD = 1.30$). The mean age at which

people thought children should start learning math was 4.07 years ($SD=2.04$; see Figure 1). People rated math education, in general, as being important ($M= 4.81$; $SD=.62$). Individuals, however, thought children were receiving only a satisfactory math education ($M= 3.15$; $SD=1.08$). Out of the entire sample, 83.5% answered that they did not have an elementary aged child ($M=1.85$; $SD=.35$), but those who did had between 1 and 3 children in elementary school ($M=1.45$; $SD=.17$). Those individuals with children in elementary school stated that they are comfortable helping their children with their math homework ($M= 4.36$; $SD=1.07$), and helped with homework for an average of 26.4 minutes a day ($SD=2.68$). However, when we asked our sample (both parents and those without elementary school-aged children) how much time parents should spend teaching math to their children, participants reported that parents should spend 34.8 minutes a day, on average ($SD=3.83$), teaching their children about math. Generally, participants supported the statement that parents are responsible for their children's education outside of school (94% agreed).

Table 1. Descriptive Statistics

| Variable | <i>N</i> | <i>M</i> | <i>SD</i> | Range |
|---|----------|----------|-----------|-------|
| At what age do you think children should start learning about math? | 542 | 4.07 | 2.04 | 0-14 |
| At what age do you think children should learn about negative numbers? | 521 | 7.52 | 2.37 | 0-15 |
| Are parents responsible for teaching math to their children outside of school?* | 566 | 1.06 | .24 | 1-2 |
| About how many hours each week should parents teach their kids about math? | 490 | 4.07 | 3.83 | 0-40 |
| Who do you believe should be most responsible for kids' math education?*** | 559 | 2.08 | .72 | 1-3 |
| I think children are receiving a good math education. | 558 | 3.15 | 1.08 | 1-5 |
| I think math is an important part of k-12 education. | 558 | 4.81 | .62 | 1-5 |
| I think learning about negative numbers is an important part of k-12 education. | 559 | 4.27 | 1.01 | 1-5 |
| I like math. | 558 | 3.84 | 1.30 | 1-5 |
| I am comfortable dealing with negative numbers now. | 558 | 3.97 | 1.28 | 1-5 |
| I think math is useful in everyday life. | 556 | 4.71 | .70 | 1-5 |
| Do you have a child in elementary school?* | 557 | 1.85 | .35 | 1-2 |
| How many children do you have in elementary school? | 80 | 1.45 | .71 | 1-3 |
| I am comfortable with helping my child with math homework. | 80 | 4.34 | 1.07 | 1-5 |
| How many hours a week do you spend helping with your kids' math homework? | 78 | 2.86 | 2.68 | 0-18 |

*= 1=yes, 2=no, **=1=teachers, 2=parents, 3=no pref.

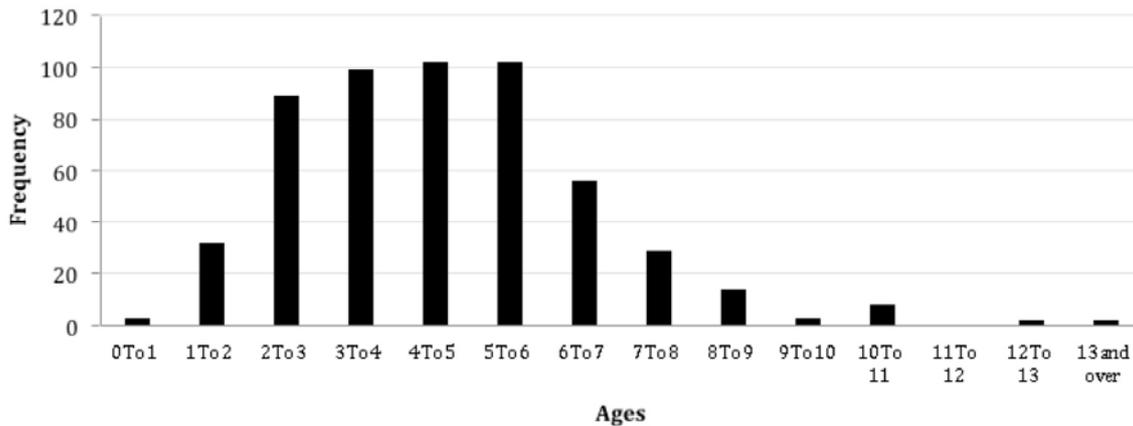


Figure 1. Participants’ responses for the age at which children should start learning math.

Comparison of elementary school parents and participants without children in elementary school

The major goal of this study was to compare the views of parents of elementary school children with others. To do so, we ran independent sample *t*-tests on all of the variables. Only two of the items in the *t*-test were significant, all of the other items run were not significant, $p > .07$. Overall, participants who had a child in elementary school thought that children should start learning math earlier ($M=3.55, SD=1.50$), compared to participants who did not ($M=4.12, SD=2.05$); $t(529) = -2.35, p = .02$. People with children in elementary school ($M=1.01, SD=.11$) were more apt to say that parents are responsible for teaching math outside of school than were people who did not have elementary school children ($M=1.07, SD=.25$); $t(554) = -1.96, p = .05$. A chi-square test of independence was used to compare the relationship between parental status (having a child in elementary school) and who was judged to be most responsible for teaching children math. The findings were significant, suggesting that there is a relationship between having a child in elementary school and thoughts about whether parents are responsible for teaching math outside of school, $X^2(1, N=556) = 3.83, p = .05$. As shown in Table 2, a greater percentage of parents of elementary school children believe that parents bear the responsibility for teaching math outside of school.

Table 2. Agreement with the Statement That Parents are Responsible for Teaching Math Outside of School by Parental Status (Having a Child in Elementary School)

| Are parents responsible for teaching math outside of school? | Yes | No |
|--|-------|------|
| People with children in elementary school | 98.8% | 1.2% |
| People who do not have children in elementary school | 93.2% | 6.8% |

Discussion

The purpose of this study was to better understand adults’ views on mathematics and mathematics education. Generally, our results were in line with previous studies (Lucas & Fugitt, 2010) in that people found math useful and math education to be important. Unlike Lucas and Fugitt (2010), our participants did not seem to enjoy math as much as their sample. We also discovered that on average, people thought that children should start learning about math around 4 years of age. To our knowledge, this is the first study to assess people’s view on how early we should start teaching math. We are particularly intrigued that adults believe that math education should begin before kindergarten. There are many math skills that can be taught at a very young age and we agree with the consensus of our participants that it should begin early. We had some participants who even said math education should begin at birth.

With regards to the public's opinion of math education, our findings did not support previous research (Kadlec and Friedman, 2007). While Kadlec and Friedman's (2007) findings showed that participants were generally pleased with the state of education, our participants were not particularly supportive of the current state of math education. It seems that people see some room for improvement in our current educational system. Several possibilities could explain this finding. One possibility is that these are differing effects by state. While both of these studies were conducted in the Midwest, educational standards vary by each state. We could be seeing differences in the educational systems in different states. It is also possible that there are real improvements needed in our educational system, more generally, and the public realizes and understands these concerns. It is also possible that changes and improvements within the educational system are being made, but that progress and growth is not being filtered out into the public. Of course, the true state of our educational system probably includes all of these possibilities. As researchers, we hope that educators seek out empirical research as the basis for making positive changes to math education. Furthermore, we encourage educators to actively engage with the public to converse about the current state of the schools and the curriculum.

Beyond general opinions of math and math education, we specifically looked at the differing views of parents who had elementary school children and individuals who did not. While parents and others shared the same views on most of the topics that we explored in this study, we found that parents with elementary aged children believed that children should start learning math at an earlier age and that they, as parents, are responsible for teaching their children math outside of school. Perhaps because parents are entrenched in the educational system, they appreciate the importance or value in teaching math from an early age. In fact there are researchers advocating for teaching children some difficult math principles, such as algebra, from a younger age (Carragher et al., 2006 and Peled & Carragher, 2007). They argue that children may be developmentally "ready" to learn more challenging mathematical concepts earlier than originally thought, and, second, by teaching these concepts earlier, it has the potential to improve children's understanding of mathematical concepts well into their future education. And, they find evidence that children *can* solve algebraic problems earlier than what current curricular standards recommend (Carragher et al, 2006). It seems that parents' views align well with these findings and implications.

While a greater percentage of parents of elementary school children supported the belief that parents are responsible for teaching math to their children outside of school, most people, in general, agreed with this position. As discussed earlier, research has shown the importance of parental involvement in math education (Powell, Seung-Hee Son, File, & Froiland, 2012). Children whose parents are actively engaged in math education show better academic outcomes. While it may be challenging in some circumstances, there are many ways to engage parents in their children's education such as getting parents involved in helping children with homework, encouraging parents to volunteer in the classroom, or by inviting parents to participate in family-focused events, such as Family Math Night (Jacobbe, Ross, & Hensberry, 2012 and Lopez & Donovan, 2009).

Overall, the findings from the current study paint a very positive outlook for math education. Adults value the importance of math education and appreciate its applicability in everyday life. People believe, as do we and other researchers, that math education should begin early in life. And, adults appreciate the role that parents have in the education of their children. While schools are certainly striving for this, we hope that more can be done to engage and include parents in the school environment, and math education specifically.

Appendix: Math Attitudes and Beliefs Survey

Note: Forced choice responses are indicated by bold font; in all other cases, the questions were open-ended.

1. At what age to you think children should start learning about math?
2. What skills should children be learning at that age?
3. At what age do you think children should learn about negative numbers?

4. Are parents responsible for teaching math to their children outside of school? **(Yes/No)**
5. About how many hours each week should parents teach their kids about math?
6. Thinking back to your k-12 education, were the majority of you former math teachers male or female? **(Male/Female)**
7. Who do you believe should be most responsible for kids' math education? **(Parents/Teachers/No Preference)**
8. I think children are receiving a good math education. **(1 = Strongly disagree to 5 = Strongly Agree)**
9. I think math is an important part of k-12 education. **(1 = Strongly disagree to 5 = Strongly Agree)**
10. I think learning about negative numbers is an important part of k-12 education. **(1 = Strongly disagree to 5 = Strongly Agree)**
11. I like math. **(1 = Strongly disagree to 5 = Strongly Agree)**
12. I am comfortable dealing with negative numbers now. **(1 = Strongly disagree to 5 = Strongly Agree)**
13. I think math is useful in everyday life. **(1 = Strongly disagree to 5 = Strongly Agree)**
14. Do you have a child in elementary school (younger than 6th grade)? **(Yes/No)**

Parent Only Questions

15. How many children do you have in elementary school?
16. I am comfortable with helping my child (or children) with math homework. **(1 = Strongly disagree to 5 = Strongly Agree)**
17. How many hours a week (*per child*) do you spend helping with your kids' math homework?

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